* Do not need to simplify/reduce final answers on Test

KEY

Chapter 10 Review

Problem 1: The blood types of 415 people are collected at a doctor's office. The table shows the breakdown of patients per blood type.

Blood Type	Number of Patients
A	125
B	115
O	130
AB	45
Total	415

a) If a person from this group is selected at random, what is the probability that this person has type O blood?

$P(\text{Blood O}) = \frac{130}{415}$

b) How many people are in the complement of AB?

not

$415 - 45 = 125 + 115 + 30 = 370$

Problem 2: A box of silverware contains 13 forks (F), 15 spoons (S) and 8 knives (K). 36 total

a) If you reach in and randomly grab one item, find the probability it is either fork or knife.

$P(\text{F or K}) = \frac{13+8}{36} = \frac{21}{36}$ → Mutually Exclusive

b) If you randomly grab two items in succession without replacement, find the probability you get a spoon and then a knife.

$P(\text{S then K}) = \frac{15}{36} \text{ (S)} \times \frac{8}{35} \text{ (K)} = \frac{120}{1260}$

c) Suppose you randomly grab one item, replace it, and grab another. Find the probability you get a two spoons.

independent

$P(\text{2 spoons}) = \frac{15}{36} \text{ (Spoon)} \times \frac{15}{36} \text{ (Spoon)} = \frac{225}{1296}$

Problem 3: 8 junior high classes will be chosen to participate in a school improvement survey. There are 21 junior high classes in the school. In how many ways can the classes be chosen?

order doesn't matter ⟹ nCr

$21C_8 = 203,490$ ways

Problem 4: Suppose that 5% of the time Todd goes to the movies twice a week, 15% of the time he goes to the movies once a week, and 80% of the time he doesn't go to the movies at all in a given week.

a) What is the expected value for the number of times Todd goes to the movies during a week?

x	$p(x)$
2	0.05
1	0.15
0	0.8

$E(x) = 2(0.05) + 1(0.15) + 0(0.8)$

$= 0.25$ times per week

b) What is the expected value for the number of times Todd goes to the movies in 3 weeks?

$E(\#\text{ times in 3 weeks}) = 3\,E(x)$ → one week

$= 3(0.25)$

$= 0.75$

Problem 5: An experiment is performed where a 3-color spinner is spun and then a 3-sided die is rolled. The possible outcomes for the spinner are red (R), blue (B), and yellow (Y) and for roll of the die are {1, 2, 3}. Identify the sample space for this experiment.

check → $\underset{\text{colors}}{3} \times \underset{\#s}{3} = 9$ total outcomes

$S = \{ 1R \quad 2R \quad 3R \quad 1B \quad 2B \quad 3B \quad 1Y \quad 2Y \quad 3Y \}$

Problem 6: Passwords for your iPhone require 6 characters. If the first three must be digits 0-9 and the last three must be lowercase letters a-z, how many different passwords can you make? with replacement

$\underset{\#}{10} \times \underset{\#}{10} \times \underset{\#}{10} \times \underset{\text{letter}}{26} \times \underset{\text{letter}}{26} \times \underset{\text{Letter}}{26} = 10^3 \times 26^3$ total passwords

Problem 7: A high school is forming a new club. The students interested in the club include: 5 freshman, 9 sophomores, 7 juniors and 8 seniors. If 4 students are to be selected to join the club, find the probability all four are sophomores.

Direct

29 total

$\frac{9}{29} \times \frac{8}{28} \times \frac{7}{27} \times \frac{6}{26} = \frac{3024}{570024} = \frac{2}{377}$

$\frac{9}{\text{Soph}} \quad \frac{8}{\text{Soph}} \quad \frac{7}{\text{Soph}} \quad \frac{6}{\text{Soph}}$

Counting

order doesn't matter $\Rightarrow {}_nC_r$

$\frac{{}_9C_4 \text{ Sophomores ONLY}}{{}_{29}C_4 \text{ ALL}} = \frac{126}{23751} = \frac{2}{377}$

Problem 8: Enrollment data for a large lecture class is shown in the table below.

	Male	Female	Total
Freshman	19	13	32
Sophomore	14	16	30
Junior	11	14	25
Senior	18	7	25
Total	62	50	112

a) Find the probability a randomly selected student is a Male.

$P(\text{Male}) = \frac{62}{112}$

b) Find the probability a randomly selected student is a Junior.

$P(\text{Junior}) = \frac{25}{112}$

c) Find the probability a randomly selected student is a Female and a Senior.

$P(\text{Female} + \text{Senior}) = \frac{7}{112}$

d) Find the probability a randomly selected student is a Male and a Junior.

$P(\text{Male} + \text{Junior}) = \frac{11}{112}$

e) Find the probability a randomly selected student Female or a Junior.

$P(\text{Female OR Junior}) = \frac{50 + 25 - 14}{112} = \frac{61}{112}$

f) Find the probability a randomly selected student Freshman or a Male.

$P(\text{Freshman OR Male}) = \frac{32 + 62 - 19}{112} = \frac{75}{112}$

g) Find the probability a randomly selected student a Female given they are a Freshman. additional info

$P(\text{Female} \mid \text{Freshman}) = \frac{13}{32}$

h) Find the probability a randomly selected student is a Senior given they are Male. already know male

$P(\text{Senior} \mid \text{Male}) = \frac{18}{62}$

Problem 9: Suppose the probability of a dog winning a ribbon at the dog show is 0.75.

a) What are the odds of winning? Express your answer in the form a:b.

$$\text{odds win} = \frac{P(\text{win})}{P(\text{lose})} = \frac{0.75}{0.25} = \frac{3/4}{1/4} = \frac{3}{1} \rightarrow 3:1$$

b) What are the odds of losing? Express your answer in the form a:b.

$$\text{odds lose} = \frac{P(\text{lose})}{P(\text{win})} = \frac{0.25}{0.75} = \frac{1/4}{3/4} = \frac{1}{3} \rightarrow 1:3$$

or just flip

Problem 10: There are 22 students in a kindergarten class. If each kindergartner can have only one task, in how many ways can the teacher assign out the following tasks: line leader, wipe down the tables, pass out papers, water the plants?

line leader tables papers plants

"Slots" (positions) have meaning ⇒ order matters

$_{n}P_{r}$

$$_{22}P_{4} = 175{,}560 \text{ total ways}$$